

SECTION 15440 PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. This Section includes the following plumbing equipments and related components or accessories:
1. Water Closets.
 2. Urinals.
 3. Lavatories (regular or handicapped).
 4. Mop-basin
 5. Electric Water Coolers.
 6. Emergency Eyewash and Shower.
 7. Water heaters (gas fired or electric).
 8. Hot Water circulating Pump.
 9. Showers (Standard and Handicapped)
 10. Wall Hydrant (Encased, Non-freeze type).
 11. Sinks and Coffee Stations.
 12. Sump Pump (Sewage ejector).
 13. Process Drain Lift-Stations (Standard or High Head).
 14. Water Pressure Booster Systems.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 7, Section 07920 "Joint Sealants"
 2. Division 15, Section 15050 "Piping Systems".
 3. Division 15, Section 15055 "Motors"
 4. Division 15, Section 15100 "Valves"
 5. Division 15, Section 15106 "Chilled Water, Condenser, Water, Cooling Tower Water, Heating Hot Water, Condensate & Process Water piping, including Hydronic Specialties."
 6. Division 15, Section 15109 "Sanitary Sewer and Storm Drains within Buildings"

1.3 REFERENCES

- A. American Gas Association (AGA):
1. AGA Z223.1, 1992 National Fuel Gas Code.
 2. AGA Z223.2, 1992 National Fuel Gas Code Handbook.
- B. American National Standards Institute (ANSI):
1. ANSI A112.36.2M, 1991 (Rev. 1998) Cleanouts.
 2. ANSI B16.18, 1984 (Rev. 1994) Cast Copper Alloy Solder Joint Pressure Fittings.
 3. ANSI B16.23, 1992 (Errata 1994) Cast Copper Alloy Solder Joint Drainage Fittings – DWV.
 4. ANSI B16.24, 1991 (Errata 1991) Cast Copper Alloy Pipe Flanges and Flanged fittings Class 150, 300, 400, 600, 900, 1500, and 2500.
 5. ANSI Z21.22, 1986 (Addenda 1990) Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

- C. Air-Conditioning and Refrigeration Institute (ARI):
 - 1. ARI 1010, 1994 Drinking Fountains and Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - 1. ASHRAE 90A, 1987 Energy Conservation in New Building Design.
- E. American Society of Mechanical Engineers (ASME):
 - 1. ASME A112.6.1M, 1997 Supports for the Off-the-Floor Plumbing Fixtures for Public Use.
 - 2. ASME A112.18.1M, 1996 Plumbing Fixture Fittings.
 - 3. ASME/ANSI A112.19.1M, 1994 (Errata 1996) Enameled Cast Iron Plumbing Fixtures.
 - 4. ASME A112.19.2M, 1995 Vitreous China Plumbing Fixtures.
 - 5. ASME A112.19.5, 1979 (R 1998) Trim for Water-Closet Bowls, Tanks, and Urinals.
 - 6. ASME A112.21.1M, 1991 (R 1998) Floor Drains.
 - 7. ASME/ANSI B16.1, 1989 Cast Iron Pipe Flanges and Flanged Fittings.
 - 8. ASME/ANSI B16.22, 1995 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 9. ASME/ANSI B16.26, 1988 Cast Copper Alloy Fittings for Flared Copper Tubes.
 - 10. ASME/ANSI B16.29, 1994 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV.
 - 11. ASME/ANSI B16.32, 1992 Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.
- F. American Society for Testing and Materials (ASTM).
- G. Commercial Item Descriptions (CID):
 - 1. CID A-A-50560, Pumps, Centrifugal, Water Circulating, Electric-Motor-Driven.
- H. Southern Building Code Congress International Incorporated (SBCCI):
 - 1. SPC, 1999 Standard Plumbing Code.
- I. National Fire Protection Association (NFPA):
 - 1. NFPA 70, 1996 National Electrical Code.
 - 2. NFPA 211, 1996 Chimneys, Fireplaces, vents, and Solid Fuel Burning appliances.
- J. Hydraulic Institute (HI).
- K. Occupational Safety and Health Administration (OSHA):
 - 1. OSHA Regulation 1910.7.
- L. Underwriters Laboratory (UL).

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the General and Supplementary Conditions.
- B. Product Data for plumbing fixtures and equipment specified, including the following:
 - 1. Certified technical data sheets shall include performance curves with system operating conditions indicated.
 - 2. Certified equipment-performance data and physical characteristics showing actual design pump performance.
 - 3. Motor ratings and electrical characteristics plus motor and fan accessories.
 - 4. Material gages and finishes.

5. Filters with performance characteristics.
 6. Manufacturer's standard installation instructions.
- C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, and methods of field assembly, components, and location and size of each field connection.
- D. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.
- E. Submit coordination drawings in accordance with Section 15050, "Piping Systems".
- F. Field test reports indicating and interpreting test results relative to compliance with specified requirements.
- G. Operation and Maintenance (O&M) data: For water coolers, emergency eyewash & shower units, water heaters, circulating pumps, sump pumps, lift stations and water pressure booster systems to include in the Operation and Maintenance (O&M) manuals as specified in General and Supplementary Conditions and Divisions 15 requirements.

1.5 QUALITY ASSURANCE

- A. NFPA Compliance: Plumbing equipments and components shall be designed, fabricated, and installed in compliance with UPC, AGA and NFPA 90A.
- B. UL and NEMA Compliance: Provide motors required as part of air-handling units that are listed and labeled by UL and comply with applicable NEMA standards.
- C. Comply with NFPA 70 for electrical components devices and accessories installation.
- D. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code (NEC), Article 100.
 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulations 1910.7.
- E. Coordination: Coordinate layout and installation of central-station air-handling units with piping and ductwork and with other installations.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment as a factory-assembled module with protective crating and covering.
- B. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate size and location of concrete housekeeping bases. Cast anchor-bolt inserts into base.
- B. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCT

2.1 FIXTURES

- A. Water Closet (wall hung): vitreous china, ASME A112.19.2M, and ASME A112.6.1M wall hung, back outlet, siphon jet action, automatic flush valve operated, elongated bowl, 1 1/2-in. top spud, ASME A112.19.5. With carrier. Provide Americans with Disabilities Act (ADA) fixtures and mounting where handicapped accessible fixtures are shown.
- B. Urinal: vitreous china, ASME A112.19.2M, wall hung, washout flush action, and automatic flush valve operated, integral trap, 3/4-in. top spud, and 2-in. outlet, ASME A112.19.5. With wall carrier. Provide ADA fixtures and mounting where handicapped accessible fixtures shown.
- C. Lavatory: White vitreous china, ASME A112.19.2M, self-rimming type for countertop installation, front overflow, 4-in. center faucet holes, drainage screen and tailpiece, ASME A112.18.1M. American Standard "Aqualyn", Kohler k-2196, Crane 1-280Y or equal.
- D. Lavatory (LAV-1):
 - 1. White vitreous china, ASME A112.19.2M, self-rimming type for countertop installation, front overflow, 4-in. center faucet holes, drainage screen and tailpiece, ASME A112.18.1M. American Standard "Aqualyn" or Kohler/Crane equal as above for standard lavatory
 - 2. Wall hung, vitreous china, ASME A112.19.2M front overflow, and 4-in. center faucet holes, ASME A112.18.1M.
- E. Lavatory (for physically handicapped LAV-2):
 - 1. White vitreous china, ASME A112.19.2M, self-rimming type for countertop installation, front overflow, 4-in. center faucet holes, drainage screen and tailpiece, ASME A112.18.1M. American Standard "Aqualyn" or Kohler/Crane equal as above for standard lavatory. Insulate and offset trap & service supplies for ADA knee-space clearance.
 - 2. Wall hung, vitreous china, ASME A112.19.2M front overflow, and 4-in. center faucet holes, ASME A112.18.1M. Insulate and offset trap & service supplies for ADA knee-space clearance.
- F. Mop Basin: Floor mounted precast receptor, 36"x24"x12" deep, set level with grout or mastic, joints at building wall sealed with mastic. With polished brass strainer, cast-in drain body, stainless steel guards all four sides, stainless steel wall guards for each adjacent wall. Fiat model TSB-700 with MSG3624 wall guards or approved equal.
- G. Electric water coolers: Single level, station type, barrier-free, lead-free, ADA compliant. Wall hung with hanger and stainless steel back panel. Chrome plated round bubbler bowls. Recessed air-cooled refrigeration unit with grille integral with back panel, serviceable from front. Elevated anti-squirt bubbler with stream guard, automatic stream regulator, and push bar for ADA compliance. 120V, 1-phase electrical. Haws model HWCA8 or equal.
- H. Emergency Eyewash and Shower: ABS plastic showerhead and eyewash, instant action stay-open valves, with 1-1/4" galvanized steel pipe with floor flange, and universal emergency sign included. With rigid pull bar and ceiling escutcheon for shower, Foot or hand control for eyewash. Guardian, Haws, Bradley or equal.
- I. Water Heaters (See schedule on drawing for type and duty conditions):
 - 1. Electric water heater (instantaneous): point of use, below-basin installation with formed steel housing, 3 kW, 120 V. See schedule on drawings.
 - 2. Electric water heater (tank type): 150-psi tank working pressure. Insulated with 2" of rigid polyurethane foam. Equipped with surface mounted thermostats with manual

- reset, high point control. Tank shall be ASME constructed and stamped for 150-psi working pressure. ARI 1010 compliant. See schedule on drawings
3. Gas water heaters: as required to meet system requirements. All heaters to meet the minimum requirements of ASHRAE Standards 90A. Each water heater to be equipped with shut-off valves, check valves, ASME pressure and temperature relief valve, controls for combustion air damper operation, Type B flue through roof or wall as shown. See schedule on drawings for duty conditions.
- J. Hot water circulating pump: provide a bronze trim, recirculating pump to ensure hot water draw to the farthest most fixture. Each recirculation system shall be complete with time clock and aqua-stat for pump control. For duty conditions, see schedule on drawings.
- K. Wall-Hydrant:
1. Encased, "anti-siphon" automatic draining wall hydrant for flush installation. Complete with non-freeze type integral "backflow-preventer", bronze casing, all bronze interior parts, non-turning operating rod with free floating compression closure valve, replaceable bronze seat and seat washer, and combination $\frac{3}{4}$ " or 1" male straight IP inlet. Nickel bronze box and hinged cover with operating key lock and "WATER" cast on cover.
- L. Sinks – Coffee Stations:
1. Stainless steel, single basin, self-rimming for countertop installation. 19 "x 18 "x $6\frac{1}{2}$ " deep, $3\frac{1}{2}$ " centered waste outlet with strainer, $1\frac{1}{2}$ " drain tailpiece, three (3) faucet holes on 4" centers, undercoated for sound suppression, with removable drain basket.
- M. Laboratory Sink:
1. Stainless steel, 18 Gauge, Type 302, single bowl, 10" deep with $1\frac{3}{4}$ " radius coved corners – self run type with satin finish. Underside shall be fully undercoated, $3\frac{1}{2}$ " diameter drain opening similar to ELKAY DLFR series #2519-10 or approved equal without a faucet ledge.

2.2 SUMP PUMP, SEWAGE EJECTOR

- A. Furnish vertical lift Duplex Sewage ejector assemblies as described herein and install the size and capacity indicated on drawings.
- B. The duplex sump pump system shall be mounted over a fiberglass or cast iron basin. Vapor tight cover plate shall have removable steel access and inspection covers. The contractor shall also furnish all valving, piping, level and motor controls necessary to provide the owner with a fully operational system.
- C. Sump Pump Construction
1. Impeller: The impeller shall be of one-piece ASTM A48, Class 30B, close grain cast iron design. The impeller shall be of semi-open design, with smooth contours, without acute turns, free of blowholes and imperfections, with high efficiency throughout a broadband operating range. The impellers shall be capable of field trimming and balancing to meet actual site-specific conditions. The impeller hub shall be accurately slip fitted and key driven to the motor shaft. The impeller shall be securely attached to the shaft by means of a locking washer and impeller screw of AISI-304 stainless steel.
 2. Volute: The pump volute casting shall be of high strength ASTM A48, Class 30B, close grain cast iron, non-concentric design, with smooth contoured surfaces and fluid passages capable of passing any solid which passes through the impeller.
 3. Motor Support Bracket: The motor support bracket shall be of ASTM A-48; Class 30B close grain cast iron with accurately machined rabbet fit between the motor and bracket. The thrust bearing housing shall be integrally cast to insure positive alignment and that the thrust bearing is a minimum of 6" above the floor.

4. Shaft: The pump shall be provided with an AISI 416 SS main pump shaft and AISI 303 SS lower stub shaft.
5. Upper Thrust Bearing: The thrust bearing shall be of single row, deep groove ball bearing design, mounted in a dust proof housing with moisture seal.
6. Lower Pump Bearing: The lower pump bearing shall be of bronze grease lubricated design.
7. Intermediate Bearing: The pump column shall be fitted with a bronze grease lubricated intermediate bearing for each 4-foot increment of column beyond the initial 6-foot sump depth.
8. Column: The pump shall be provided, as standard, schedule 40 steel columns with machined flanges, assuring perfect alignment between the pump volute and motor.
9. Motor Construction: A Vertical mounted, C-face, totally enclosed electric motor of ball bearing design shall be directly connected to the pump through a flexible coupling. The motor shall be of ample capacity to deliver the specified GPM and TDH.
10. Sump cover: The basin sump cover shall be of fabricated steel, suitable to pump size and ½ inches thick and shall be of vapor tight construction, with sub-plates and openings as indicated on the plans.
11. Sump Basin: The contractor shall provide a fiberglass or cast iron sump basin with inlet and vent connections as indicated on the plans.
12. Control Panel: The electrical controls shall be mounted inside a NEMA 3R enclosure fabricated of steel. The enclosure shall be provided with a through the door disconnect and bear a UL level of an enclosure manufacturer.
13. Wiring/Conduit: All pilot duty control circuit wiring inside the control panel, shall be a minimum of MTH, 600 volt rated, 18 gauge with 90°C temperature rating, in accordance with UL standards. All conduit connections are to be UL listed and installed in accordance with NEC standards. All current carrying wire and conduit shall be properly sized in accordance with NEC standards.
14. Motor Protection: a properly sized motor starter shall protect each pump motor. The magnetic motor starter is to be of open across-the-line type, bearing a UL label for motor control devices and properly sized by motor horsepower.
All motor starters shall be equipped with under-voltage release and overload protection. An overload reset button shall be mounted through the door to permit resetting of the starter overload without opening the panel door.
15. Mechanical Float Alternator: (Duplex) The automatic pumping cycle, alternation and override function shall be controlled with a NEMA (1/4/7/9) mechanical ball and rod float alternator switch, mounted onto the cover plate with vapor tight stand. The mechanical alternator shall be provided with 2 – sets of DPST, lever operated, snap action contact. The mechanical alternator shall be field adjustable, and provide automatic alternation of two pumps. Automatic override starting the second pump when needed shall also be provided.
16. Compression Alarm: An additional compression type sensor shall be provided to sense the static pressure of air trapped in the compression pipe as the liquid level rises. The compression alarm switch shall be provided with SPDT snap action contact. In addition, the high water alarm sensor shall activate an audible-visible combination remote mounted NEMA 3R red light and (bell/horn). A “Push-to-Silence” button shall be provided which will activate a relay silencing the audible alarm; the visual light will continue to indicate an alarm condition until the condition has been corrected.
17. Dry Contacts: Dry contacts shall be provided inside the control panel to interface with the local alarm.

2.3 DRAIN LIFT STATION (PROCESS AND SANITARY WASTE)

- A. Furnish and install factory assembled, weatherproof, watertight and tested package Lift-Stations for transferring Process Drain (PD) collected from the various DI water systems or collected as condensation drainage from cooling coil drain pans of HVAC air handling units.

Lift-Station assembly size and capacity shall be as indicated on drawings and as described herein. Lift-Stations described herein are referred to as "Standard" or "High Head" types.

- B. Standard PD Lift Station shall operate automatically in response to two (2) sets of Liquid Level Controllers consisting of High & Low latching set point and one with a high alarm-switch.
 - 1. The Stage 1 controller (High level) shall turn "ON" the "Lead-pump" and similarly the low level controller shall turn the operating pump "OFF". The lead-pump shall be cycled as required. The Stage 2 (second set) of controllers shall be used to control the "Lag-pump". This controller operates the same fashion as the first-stage controller except that the "High-Level", "ON" set point shall be set slightly higher level than the first. This is to prevent that when an overcapacity or a lead-pump failure occurs, the "Lag-Pump" shall activate thus increasing the discharge rate up to twice that of the "Lead-pump".
 - 2. A sequencing circuit shall alternate the lead-lag pumps after the end of each pump-down cycle as to provide even cycling times for each pump.
 - 3. The alarm shall activate when the liquid level raises the float to the High-Level" alarm set point. The switch remains activated until re-set manually.
- C. Standard Lift-Station assembly shall consist of: Tank, Duplex Pumps, Suction check valves, Polypropylene ball discharge check valves, Liquid-level Controllers and integral Control Panel.
 - 1. Tank: The Lift-Station tank (26" x 18" x 11" high) shall be constructed of white polypropylene with welded joints. The tank walls shall be manufactured out of 1/2" thick material. Inlets shall be 1 1/2" diameter threaded polypropylene fittings welded on the inside and the outside of the tank wall. Vapor tight cover plate shall have removable steel access and inspection covers. Provide a suitable size of base-plate for floor anchoring. The contractor shall also furnish all required valves, piping, level and motor controls necessary to provide the owner with a fully operational system.
 - 2. Duplex pumps: The pump shall be of a seal-less design, vertical arrangement. Piping and fittings shall match the check valve material. Penetrations of the pump discharge pipe shall be compression bushing sealed to the mounting plate as to achieve a watertight seal. Pump motor shall be epoxy coated TEFC with drip cover. Pump wet ends shall be natural unfilled Polypropylene.
 - 3. Liquid Level Control: Controllers shall be all plastic construction. The wet ends shall be Polypropylene material, power interrupt pump down reset, pump down ground default interrupt, and latching control for the pump circuit.
 - 4. Control Panel: The Panel enclosure shall be UL listed and shall be built to conform to the National Electrical Codes (NEC). Factory color coded wires, and labeled terminal bars as to allow for single point electrical connections to house power. All connections to the panel and conduit must conform to NEMA 4 and NEC Standards. The Panel shall contain 2 motor starters that consist of a thermal overload relays with bimetallic heaters matched to the pump motor loads. The motor contactors shall be a heavy duty hermetically sealed mercury displacement type relays with maximum motor rating published on the relay housing. The relays shall not require contact replacement. Circuit breakers, fusing, and or safety disconnect switch for the pump station will be provided by the contractor to meet local, state and national building codes. The Control panel shall be station mounted to the pump mounting bracket.
- D. High Head Condensate Pump System.
 - 1. Remote location in the LINAC tunnel where gravity drainage of condensation from cooling coil drain pan is not feasible directly, provide and install a High Head Condensate Lift-Station capable to transport collected condensation of approx. 7.5 GPM at 45 feet of head pressure to a remote collection tank as indicated on drawings. Pump Lift Station motors shall be furnished with a 1/5 Hp thermal overload protected motor and six (6) feet of 3-wire cord suitable for 115 VAC.

2. Pump shall be UL listed and CSA certified. Assembly shall be rated for a maximum design temperature of 120°F. Materials in contact with Process Drainage (PD) shall be 316 Stainless steel.
3. Tank material shall be polystyrene; capacity shall be one (1) gallon minimum.

F. Water Pressure Booster System.

1. Provide and install factory assembled and tested Water Pressure Booster System of size, capacity and electrical characteristics as indicated on drawings and as described herein which is capable of maintaining required water pressure continuously. The system shall be factory assembled, wired and hydrostatically tested in accordance with the Hydraulic Institute Standards for centrifugal pumps.
2. The system shall be complete with a pressure monitoring, redundant, sequencing systems completely separate from the primary sequencing device.
3. Hydro-pneumatic tank interface: When system pressure drop in the system is sensed by the transducer, the secondary sequencer shall energize the "lead" pump and subsequently the "lag" pump until design system pressure is achieved.
4. All components of the assembly shall be mounted on a compact skid, ready for connections of power and services. The assembly shall consist of but not limited to the following:
 - a. Pressure Pumps: Duplex (two 50% capacity each), vertical multistage with high temperature mechanical seal assembly. Pump suction/discharge chamber, impellers, pump shaft, diffuser chambers, outer discharge sleeve, and impeller ring retainers shall be constructed of 316 Stainless steel. Motor shall be mounted directly to the top of the pump. Pumps shall be equipped with a high temperature mechanical seal assembly.
 - b. Hydro-pneumatic pressure Tank: Size and Capacity as indicated on drawings, Bladder type, Stainless Steel, designed to ASME code and stamped for 200 PSI maximum pressure. Bladder shall be made of heavy duty "Butyl" rubber approved for potable water application.
 - c. Control Panel: UL labeled, NEMA 3R enclosure, complete with factory installed programmable controller, magnetic starters with thermal overload protection, reset pushbuttons, externally operable disconnect switch, breakers, H-O-A switches, pump running lights, minimum-run timers, CCT and an audible alarm package.
 - e. Isolation valves complete with all necessary trim & accessories such as non-slam check valves, balancing valve, suction and discharge pressure gauges.
 - f. The system shall be protected by a thermal purge system to protect all pumps from overheating. The thermal purge manifold shall be separate from the main manifold and shall be 316 Stainless Steel.
 - g. Install air bleed fittings / petcocks at all system high points.

2.4 PLUMBING COMPONENTS

- A. Faucets (for Mop-Basins & Service-Sinks): rough chrome finish, 1/2-in. union couplings, bucket hook, hose spout end, lever handles, and vacuum breaker, ANSI A112.18.1M. Chicago Faucet Model # 911 or approved equal.
- B. Sensor Operated Faucets (for Lavatories): Chrome plated brass, with vandal proof Aerator, 1/2" NPSM Mounting Shank, Infrared Sensor, 18" long shielded cable to connection box. Provide 120V 60Hz converter to 12V DC solid-state control circuit, 0.5 second "OFF" delay, 30-second "Time-out" feature. Factory set sensor range 4", 12V DC solenoid valve and plug-in transformer. Operating temperature 32 °F to 140 °F (0°C to 60°C).
- C. Traps (for Lavatories): Chrome finish, cast brass, swivel ell, 1 1/4-in. inlet, 1 1/2-in. outlet, ground swivel joint, cleanout plug. Offset and insulated at handicapped-accessible lavatories.

- D. Lavatory (Hand-wash) Supply: Chrome finish, threaded 3/8-in. pipe inlet, escutcheon, wheel control stop, 3/8-in. X 12 3/4-in. flexible tube riser. Insulated at handicapped-accessible lavatories.
- E. Lavatory Drain: Chrome finish, 1 1/4-in. X 4-in.-long tailpiece, integral perforated grid.
- F. Water Closet Flushometer: Chrome plated, exposed type, IR sensor, oscillating no hold open handle, 1-in. screwdriver-operated angled stop valve with protective cap, adjustable tailpiece, vacuum breaker flush connection, 1 1/2-in. top spud. Battery powered.
- G. Urinal Flushometer: Exposed, quiet-operating diaphragm type. Chrome plated, for right hand supply, equipped with solenoid operator, IR sensor, four temper proof screws and chrome plated wall cover plate, non hold-open feature, 1" I.P.S. Screwdriver angle stop with protective cap, adjustable Tailpiece, vacuum Breaker, flush connection and top spud coupling. Wall and spud flanges. Battery powered.
- H. Faucet Set (Lab Sinks – Standard): Gooseneck swivel spout with integral vacuum breaker and barbed hose-connection outlet. Dual water supply control valves, back (wall) connection with individual wrist handles, 8" centers. With wall escutcheon. All chrome plated. Chicago Faucet model 942 with GN2BVB vacuum breaker or approved equal.
- I. Faucet Set (Lab Sinks – Deionized Water): PVC gooseneck spout with barbed hose connection outlet. Single water supply control valve, back (wall) connection with wrist handle, wall escutcheon. Chicago Faucet No. 870-B or approved equal.
- J. Faucet Set (Coffee Station Sinks): Elevated swivel spout with aerator head. Dual supply concealed valves with wrist handles, 8" centers, and bottom connections. Chicago faucet model 785 or approved equal.

2.5 ACCESSORIES

- A. Toilet Seats: white, solid plastic seat, heavy duty, for elongated bowl, open front, stainless steel hinge with check.
- B. Supports (for wall mounted fixtures): ANSI 112.6.1M. Wall and floor type suitable for imposed weight load.
- C. Sealants: sanitary, silicon type.
- D. Escutcheons: chrome-plated steel.
- E. Water hammer arrestors: piston operated, type "K" copper barrel, maintenance free.
- F. Trap primer valve: corrosion resistant brass, "O" ring seals tested at a temperature range of – 40 degrees to 450 degrees F, 1/2" inlet and outlet opening. For installation on intermittently flowing water line
- G. Access door (trap primer valve): 8" x 8" nominal door opening, door and frame fabricated from 16 gage galvanized steel, prime coat finish, and concealed pivoting rod hinge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
- B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE AND EQUIPMENT INSTALLATION

- A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall hanging fixtures onto waste fitting seals and attach to supports.
- D. Install wall-hanging fixtures with tubular waste piping attached to supports.
- E. Install counter-mounting fixtures in and attached to casework.
- F. Install fixtures level and plumb according to manufacturers' written instructions and rough-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 15; Section 15100 "Valves" for general-duty valves.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- J. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- K. Install toilet seats on water closets.
- L. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- M. Install water supply, flow-control fittings with specified flow rates indicated below in fixture supplies at stop valves:
 - 1. Water Closet (WC): Sensor operated "Flush-meter", 1.6 gallon (6.0 liter) per flush cycle.
 - 2. Urinal (UR): Sensor operated "Flush-meter", 1.0 gallon (3.8 liter) per flush cycle.

- N. Install Lavatory faucet (LAV) flow-control fittings with sensor operated lavatory faucets with 0.5 GPM (1.9 liters per minute) flow rates and patterns in faucet spouts. If faucets are not available with required flow rates and patterns, include adapters to achieve specified flow rates.
- O. Install shower, with water saving flow control devices to provide 2.5 GPM (9.4 liters) maximum flow rates and be capable automatically to adjust to line water pressure variations and still maintain specified flow rate in shower arms.
- P. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- Q. Install escutcheons at piping wall-ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.
- R. Set shower receptors and service basins in leveling bed of cement grout.
- S. Installation of the sewage pumping equipment shall be in accordance with the drawings and manufacturer's instructions. All equipment shall be supported and securely anchored, making sure all connections are plumb and tight. All construction debris shall be removed from the system and wet well prior to operation of the pumping equipment. Start-Up and Field Testing: the pump manufacturer's factory trained start-up representative shall conduct Start-up and operational test. The start-up and operational test shall be conducted in the presence of the engineer, owner operator personnel and the contractor. Final site-specific level control adjustments shall be made to ensure proper functioning of the system.
- T. Refer to Division 7, Section 07920, and "Joint Sealants" for sealant and installation requirements.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in Division 15, Sections 15103 and 15109. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use proper size fittings as required to match fixtures. Connect to plumbing piping.
- E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.
- F. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Verify that installed fixtures are categories and types specified for locations where installed.

- B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms in preparation for final inspections.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets, shower valves, and flushometer valves to produce proper flow and stream.
- C. Engage a factory-authorized service representative to train CM designated operating and maintenance personnel to adjust, operate and maintain Water Coolers, Emergency Eyewash & Shower, electric or gas Water Heaters, Hot-Water Re-circulating Pumps, Sump Pumps, process-drain (PD) Lift-Stations and Water Pressure Booster Systems as specified below.
 - 1. Train maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing and maintaining all the above assemblies specified above.
 - 2. Review data in Operating and Maintenance (O&M) manuals.
 - 3. Schedule training with CM at least seven days' advance notice.
- D. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities unless approved in writing by the Construction Manager.

END OF SECTION 15440